FCC TEST REPORT

UCS Co., Ltd.

#702, Megavalley, 799 Kwanyang-dong, Dongan-gu, Anyang-city, Kyunggi-do, 431-767, Korea
Tel : 82-31-420-5680/Fax :82-31-420-5685, Open Site : 82-31-355-2666

FCC Test Report

Report Number	UCSFR-1109-002			
Applicant	Company Name	ZARAM TECHNOLOGY CO., LTD.		
	Address	5 Fl, Sindoricho Bldg, 514-1, Yatap-dong, Bundang-gu, Seongnam-City, Gyeonggi-Do, Korea		
Product	Product Name	Bluetooth HID Dongle		
	Model Name	BT-300KMS	Manufacturer	T.B.M TELECOM
	Serial No.	-	Country of origin	Korea
Other	Receipt Date	2011-08-31	Receipt Number	UCS-PJ-11-0486
	Issued Date	2011-10-04	Tested Date	2011/09/20 ~ 2011/09/21
Test Result	**Pass**			
Standard	**FCC CFR 47 Part 15.247 Subpart C**			
Test Method	**ANSI C63.4**			
Tested by	Y. R. Jo (sign)			
Approved by	D. Y. Lim (sign)			

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Contents

1. Applicant Information

Applicant Name	:	ZARAM TECHNOLOGY CO., LTD.
Address	:	5 Fl, Sindoricho Bldg, 514-1, Yatap-dong, Bundang-gu, Seongnam-City, Gyeonggi-Do, Korea
Manufacturer	:	T.B.M TELECOM
Country of Origin	:	Korea

2. Test Result Certification

2.1 Applicable standards

Standard	Test Item	CFR 47 Section	Result
FCC CFR 47 Part 15.247 Subpart C	Antenna Requirement	15.203, 15.247(b)(4)	PASS
	20dB Bandwidth	15.247(a)(1)	PASS
	Maximum Peak Output Power	15.247(b)(1)	PASS
	Carrier Frequency Separation	15.247(a)(1)	PASS
	Number of Hopping Channels	15.247(a)(1)(iii)	PASS
	Time of Occupancy (Dwell Time)	15.247(a)	PASS
	Spurious Emission, Band Edge, and Restricted bands	15.247(d), 15.209	PASS
	AC Power Line Conducted Emissions	15.247(a)	PASS
	Receiver Spurious Emissions	-	PASS
	RF Exposure	15.247(i), 1.1307(b)(1)	PASS

3. EUT Information

3.1 RF specification

Product name	Bluetooth HID Dongle
Model name	BT-300KMS
Power source	DC 5.0v(USB)
Output Power	MAX 0.00017 W
Ferquency range	2.4GHz(2402MHz ~ 2480MHz)
Number of channels	79CH
Modulation Technique	FHSS(GFSK)
Antenna specification	-8.54 dBi gain (Max)
USB interface	USB 2.0, Plug & Play
O/S	Window ME/2000/XP/Vista/Window 7/Mac OS
Weight	43(L)mm X 18(W)mm X 5(H)mm
Dimension	10g

4. Laboratory Information

4.1. General

UCS Co., Ltd. established 1999 as the International agreed upon laboratory(CBTL, KOLAS) for Standard. Internally, UCS Co., Ltd. is the designated test laboratory from Radio Research Laboratory of Korea Communications Commission and Korea Food & Drug Administration.

Based on its extensive experience and expertise, UCS Co., Ltd. is the Global test laboratory that has best professionalism in this field.

4.2. Test Site

- UCS Co., Ltd. (Universal Certification Solution)
- FCC Designation Number : KR0045
- This test site is in compliance with ISO/IEC 17025 for general requirements for the competence of testing and calibration laboratories.

4.3 Location

UCS Co., Ltd.

- #702, Anyang Megavalley799, Gwanyang2-dong, Dongan-gu, Anyang-si, Gyeonggi-do, 431-767, Korea

ER Center

- #476-4, Hwalcho-dong, Hwaseong-si, Gyeonggi-do, 445-150, Korea

5. Measurement conditions

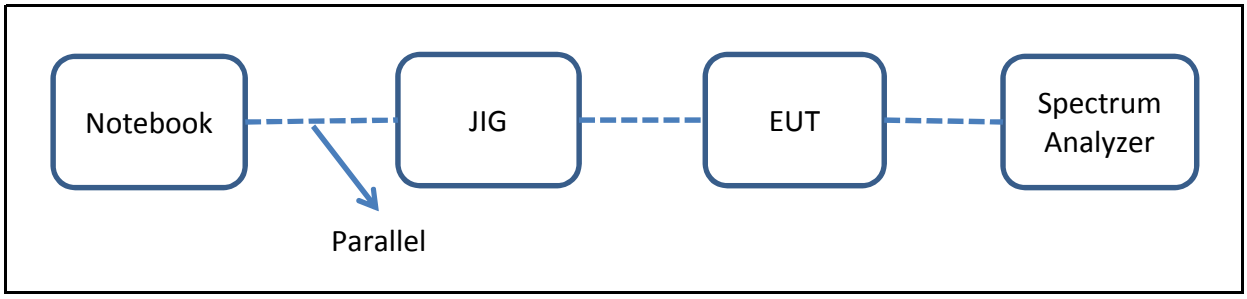
5.1 Description of test modes

- The EUT had been tested under the operating condition.
- There are three channels have been tested as following:
- Channel Low and Channel High with higher data rate were chosen for full testing.

Channel	Frequency (MHz)
LOW	2402
MIDDLE	2441
HIGH	2480

5.2 Description of test configuration

- The measurements were taken in continuous transmitting mode using the TEST MODE. For controlling the EUT as TEST MODE, the test program and the cable assembly were provided by the applicant.



[System Block Diagram of Test Configuration]

5.3. Setup of equipmet under test

5.3.1. Description of support units

- The EUT has been tested as an independent unit along with the following necessaryaccessories or support units, which are adopted to form a representative test configuration.

No	Equipment	Manufacturer	Model	S/N
1	Notebook**	TOSHIBA	PSMDCK-06L001	-
-	TEST JIG**	ZARAM TECHNOLOGY CO., LTD.	-	-

Notes:

** For control of the RF module via SPI interface in the EUT. For radiated spurious emission measurements, the EUT was tested as stand-alone equipment without TEST JIG, setting the EUT to TEST MODE.

5.3.2. Type of Used Cables

No	START		END		CABLE	
	NAME	I/O PORT	NAME	I/O PORT	LENGTH(m)	SHIELDED
1	Notebook	USB	TEST JIG	RS-232	1.0	Shielded
-	-	-	-	-	-	-

6. Limite And Result

6.1 Antenna requirement

6.1.1 Regulation

According to §15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this Section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

And according to §15.247(b)(4), the conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. Except as shown in paragraph (c) of this section, if transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1), (b)(2), and (b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

6.1.2 Result : PASS

The transmitter has an integral Chip antenna. The directional gain of the antenna is -8.54 dBi.

6.2 20dB Bandwidth

6.2.1 Regulation

According to §15.247(a)(1), frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater. Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW.

6.2.2 Test Condition

- Set RBW of Spectrum analyzer to 10 kHz, Span=3MHz, Sweep=auto
- The 20dB bandwidth is defined as the frequency range where the power is higher than the peak power minus 20dB . Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater.

6.2.3 Test result : PASS

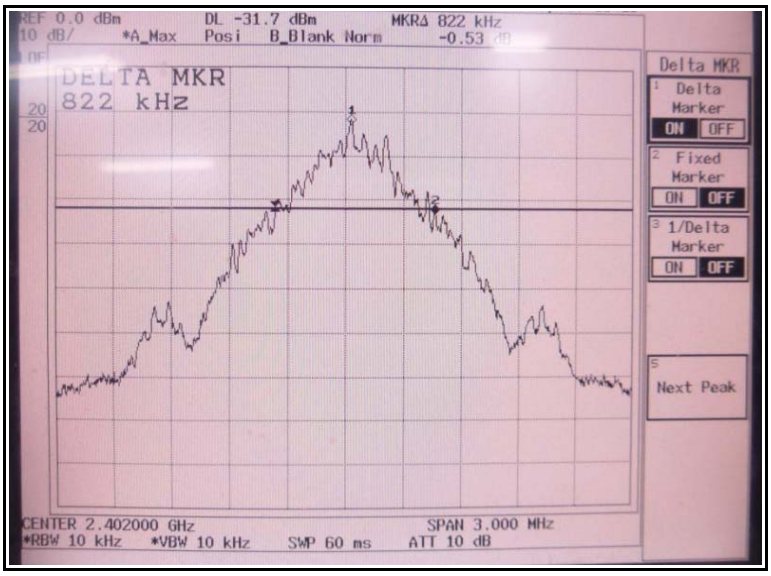
Table 1 : Measured values of the 20dB Bandwidth

Modulation	Frequency (MHz)	Result (kHz)	Verdict
Basic (GFSK)	2402	822	PASS
	2441	918	PASS
	2480	945	PASS

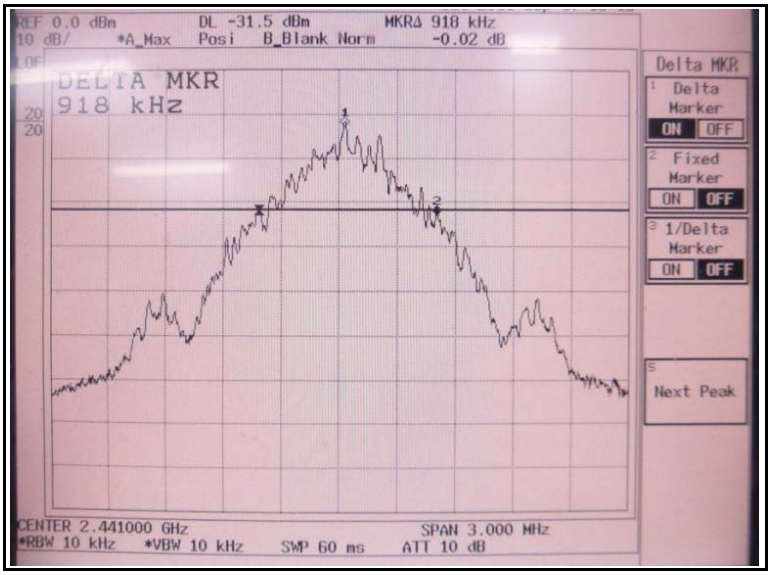
6.2.4 Plot of the 20dB Channel Bandwidth

Basic(GFSK)

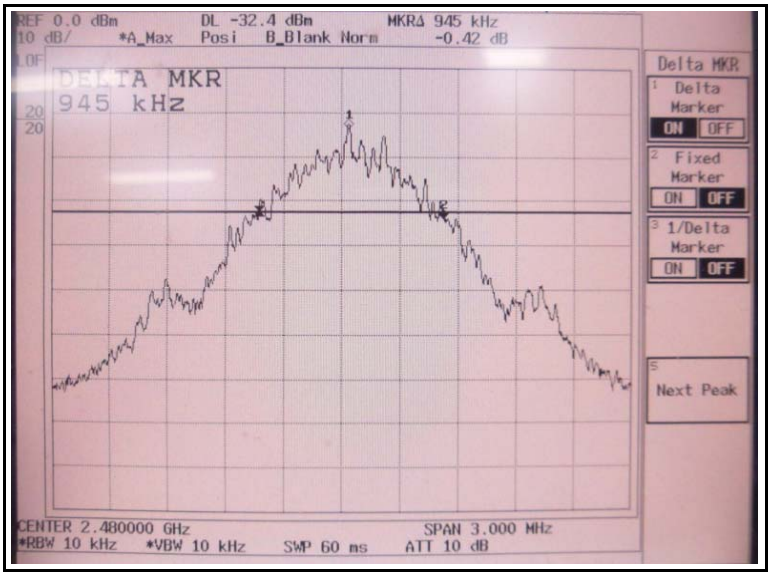
Lowest Channel



Middle Channel



Highest Channel



6.3 Maximum peak power

6.3.1 Regulation

According to §15.247(b)(1), for frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 75 non-overlapping hopping channels, and all frequency hopping systems in the 5725-5850 MHz band: 1 watt. For all other frequency hopping systems in the 2400-2483.5 MHz band: 0.125 watts.

According to §15.247(b)(4), the conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. Except as shown in paragraph (c) of this section, if transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1), (b)(2), and (b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

6.3.2 Test Condition

- Set RBW of Spectrum analyzer to 1 MHz
- The Maximum Power is defined as the total transmit power delivered to all antennas and antenna elements averaged across all symbols in the signaling alphabet when the transmitter is operating at its maximum power control level. For frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 75 hopping channels, and all frequency hopping systems in the 5725-5850 MHz band: 1 watt.

6.3.3 Test result : PASS

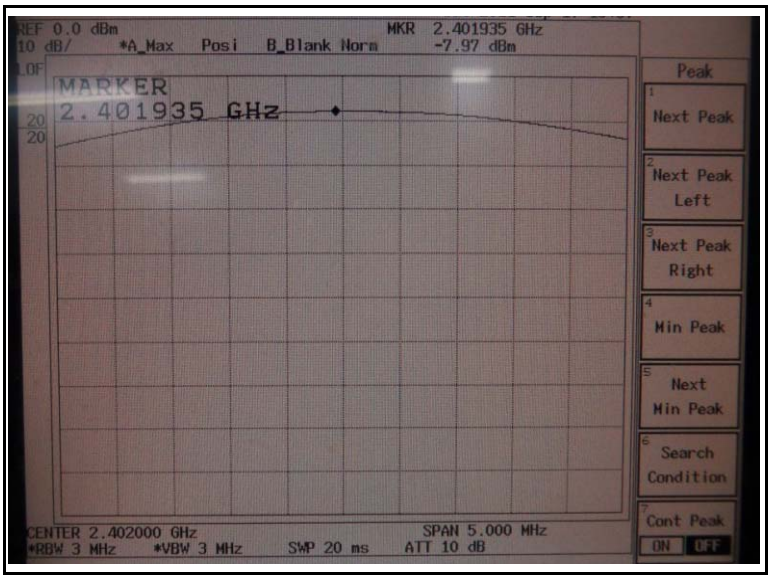
Table 2 : Measured values of the Maximum Peak Output Power(Conducted)

Modulation	Frequency (MHz)	Reading Power (dBm)	Output Power (W)	Limit (W)	Verdict
Basic (GFSK)	2402	-7.97	0.00016	1	PASS
	2441	-7.68	0.00017	1	PASS
	2480	-8.36	0.00015	1	PASS

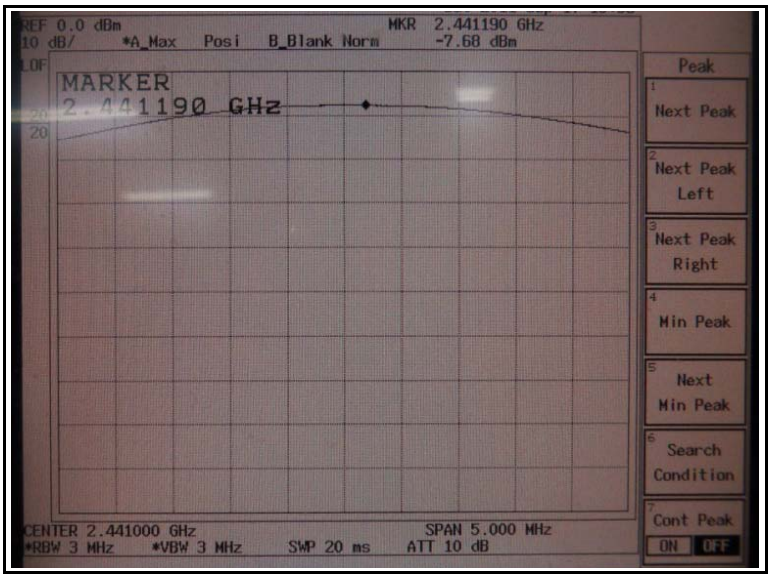
6.3.4 Plot of the Maximum Peak Output Power(Conducted)

Basic(GFSK)

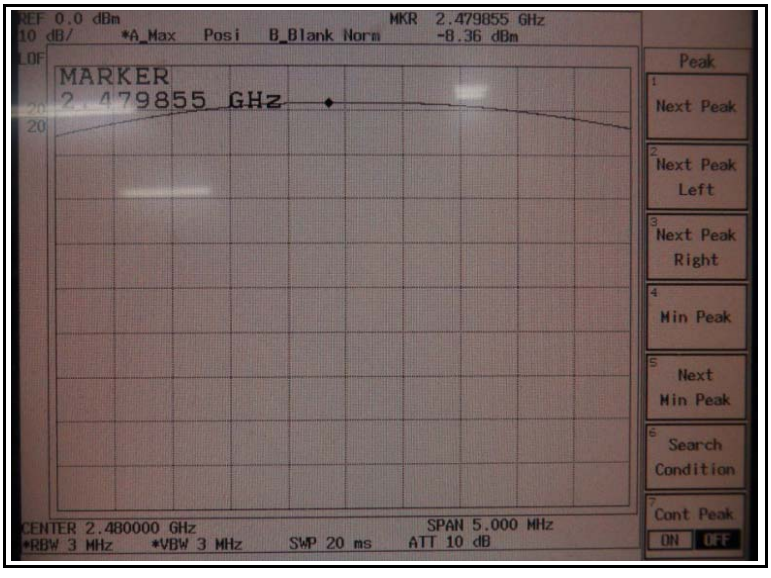
Lowest Channel



Middle Channel



Highest Channel



6.4 Carrier Frequency Separation

6.4.1 Regulation

According to §15.247(a)(1), frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater.

Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW.

the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1), (b)(2), and (b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

6.4.2 Test Condition

- Set RBW of Spectrum analyzer to 10 kHz, Span=3MHz, Sweep=auto
- Frequency hopping system shall have hopping channel carrier frequencies separated by minimum of 25 kHz or the 20dB bandwidth of the hopping channel, whichever is greater.

6.4.3 Test result : PASS

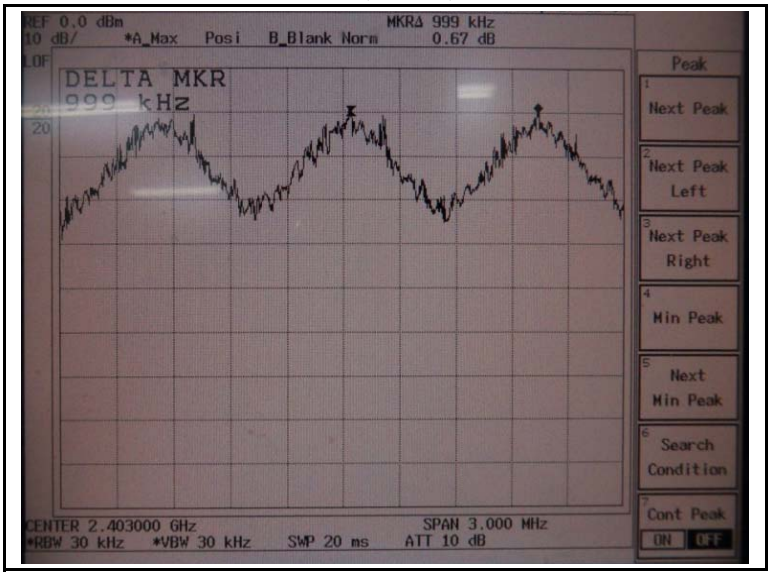
Table 3 : Measured values of the Carrier Frequency Separation

Modulation	Operating frequency (MHz)	frequency separation (kHz)	Limit (frequency separation)	Verdict
Basic (GFSK)	2402	999	>25 kHz or >2/3 of the 20dB BW	PASS
	2441	1002		PASS
	2480	1011		PASS

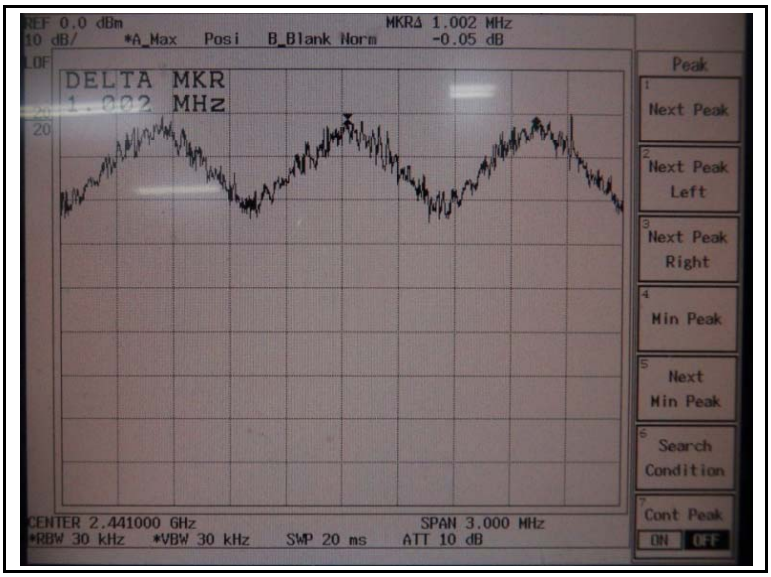
6.4.4 Plot of the Carrier Frequency Separation

Basic(GFSK)

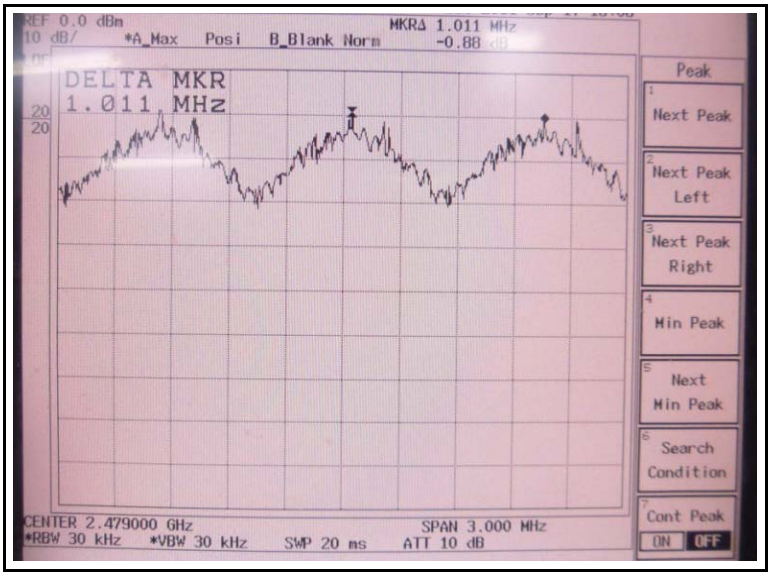
Lowest Channel



Middle Channel



Highest Channel



6.5 Number of Hopping Channels

6.5.1 Regulation

According to §15.247(a)(1)(iii), frequency hopping systems in the 2400-2483.5 MHz band shall use at least 15 channels. The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed. Frequency hopping systems may avoid or suppress transmissions on a particular hopping frequency provided that a minimum of 15 channels are used.

6.5.2 Test Condition

- Set RBW of Spectrum analyzer to 100 kHz
- Frequency hopping systems in the 2400-2483.5 MHz band shall use at least 15 channels.

6.5.3 Test result : PASS

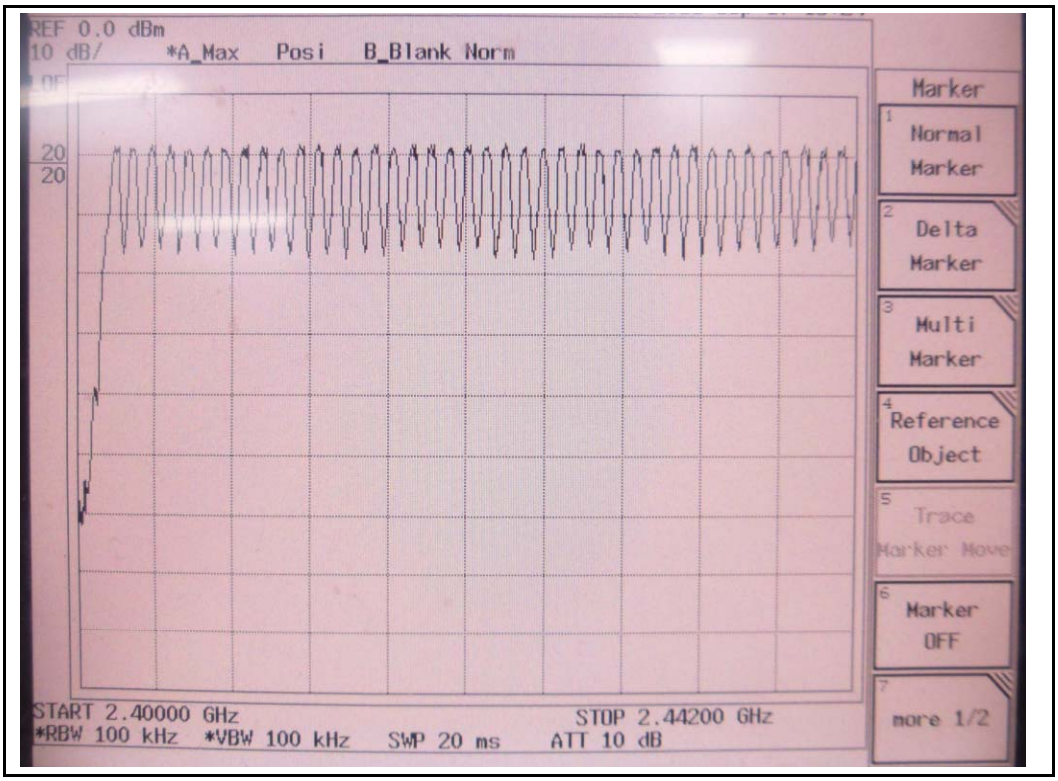
Table 4 : Measured values of the Number of Hopping Channels

Modulation	Operating frequency (MHz)	Result (channel)	Limit (channel)	Verdict
Basic (GFSK)	2402 ~ 2480	79	>15	PASS

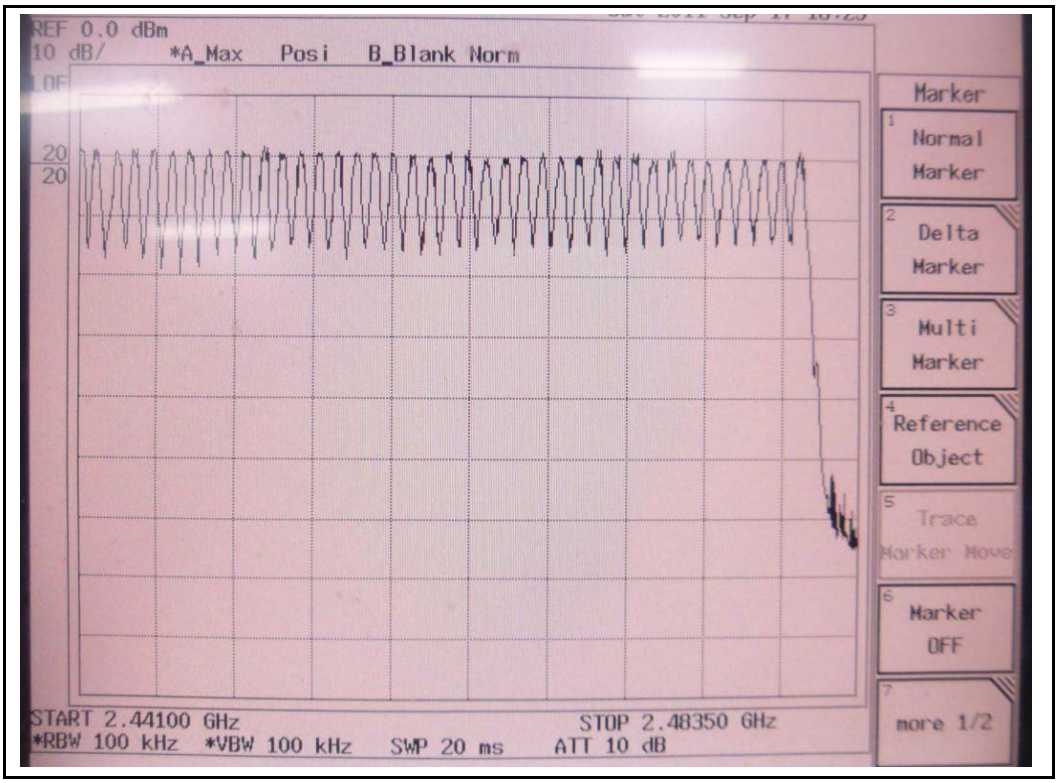
6.5.4 Plot of the Number of Hopping Channels

Basic(GFSK)

2402 ~ 2441MHz



2442 ~ 2480MHz



6.6 Time of occupancy (Dwell time)

6.6.1 Regulation

According to §15.247(a)(1)(iii), frequency hopping systems in the 2400-2483.5 MHz band shall use at least 15 channels. The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed. Frequency hopping systems may avoid or suppress transmissions on a particular hopping frequency provided that a minimum of 15 channels are used.

6.6.2 Test Condition

- Set RBW of Spectrum analyzer to 1 MHz, sweep time is 4.0 ms
- Frequency hopping systems in the 2400-2483.5 MHz band shall use at least 15 channels. The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed. Since the Bluetooth technology uses 79 channels this period is calculated to be 31.6 seconds.

6.6.3 Test result : PASS

Table 5 : Measured values of the Dwell Time

Modulation	Operating frequency (MHz)	Reading (ms)	hop rate (hops/s)	Number of hopping Channels	Period Time	Dwell time (ms)	Limits (ms)	Verdict
Basic (GFSK)	2402	2.928	266.667	79	31.6	0.31	≤ 400	PASS
	2441	2.928	266.667	79	31.6	0.31	≤ 400	PASS
	2480	2.928	266.667	79	31.6	0.31	≤ 400	PASS

Dwell time = Reading X (Hop rate / Number of hopping Channels) X Period Time

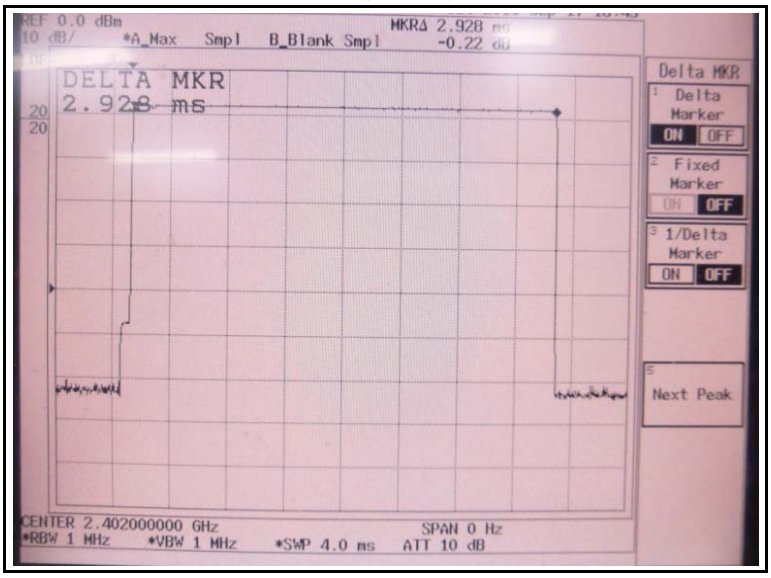
Period Time = 0.4[seconds / channel] X 79[channel] = 31.6 [seconds]

Note : The EUt makes worst case 1600 hops second or 1time slot has a length of 625us with 79 chanels. The DH5 (GFSK) packet need 5 time slot for transmitting and 1 time slot for receiving. Then the EUT makes worst case 266.667 hops per second with 79 channels.

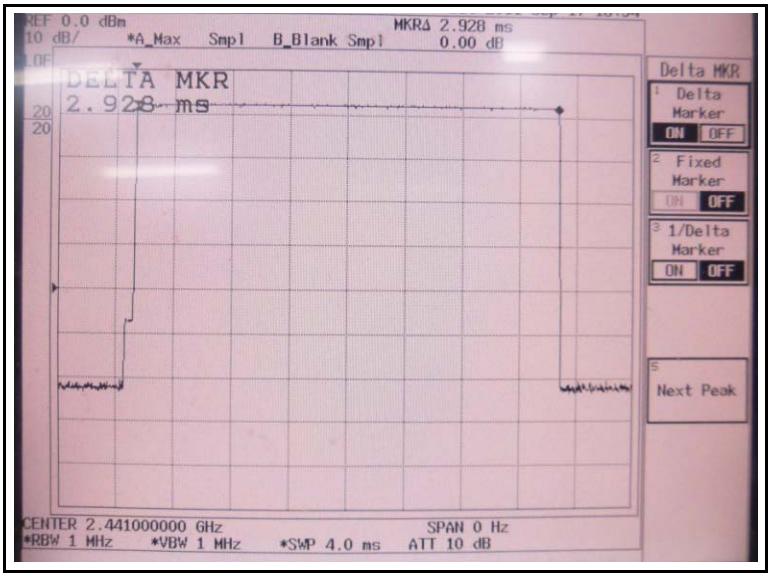
6.6.4 Plot of the Carrier Dwell Time

Basic(GFSK)

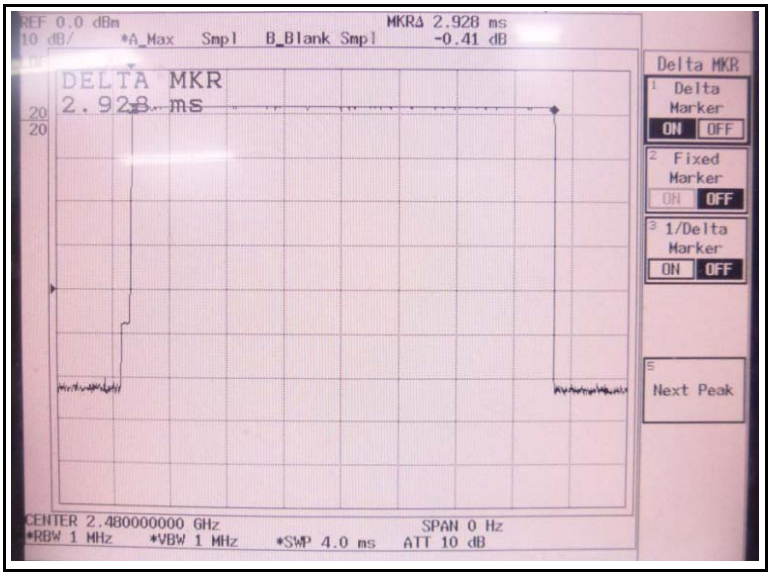
Lowest Channel



Middle Channel



Highest Channel



6.7 Spurious emissions, Band edge, and Restricted bands

6.7.1 Regulation

According to §15.247(d), in any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in Section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a) (see Section 15.205(c)).

According to §15.209(a), for an intentional device, the general requirement of field strength of radiated emissions from intentional radiators at a distance of 3 meters shall not exceed the following values:

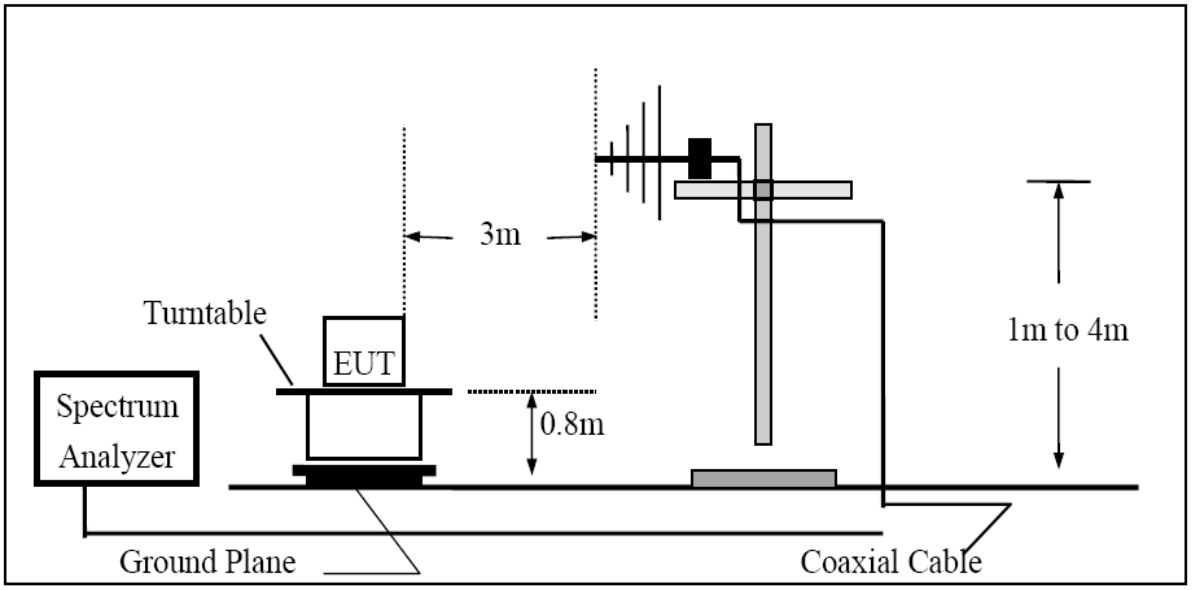
Frequency (MHz)	Field strength (μV/m)	Field strength (dBμV/m)	Measurement distance (meters)
0.009-0.490	2400/F(kHz)	-	300
0.490-1.705	24000/F(kHz)	-	30
1.705-30	30	29.5	30
30–88	100	40.0	3
88–216	150	43.5	3
216–960	200	46.0	3
Above 960	300	54.0	3

According to §15.109(a), for an unintentional device, except for Class A digital devices, the field strength of radiated emissions from unintentional radiators at a distance of 3 meters shall not exceed the above table.

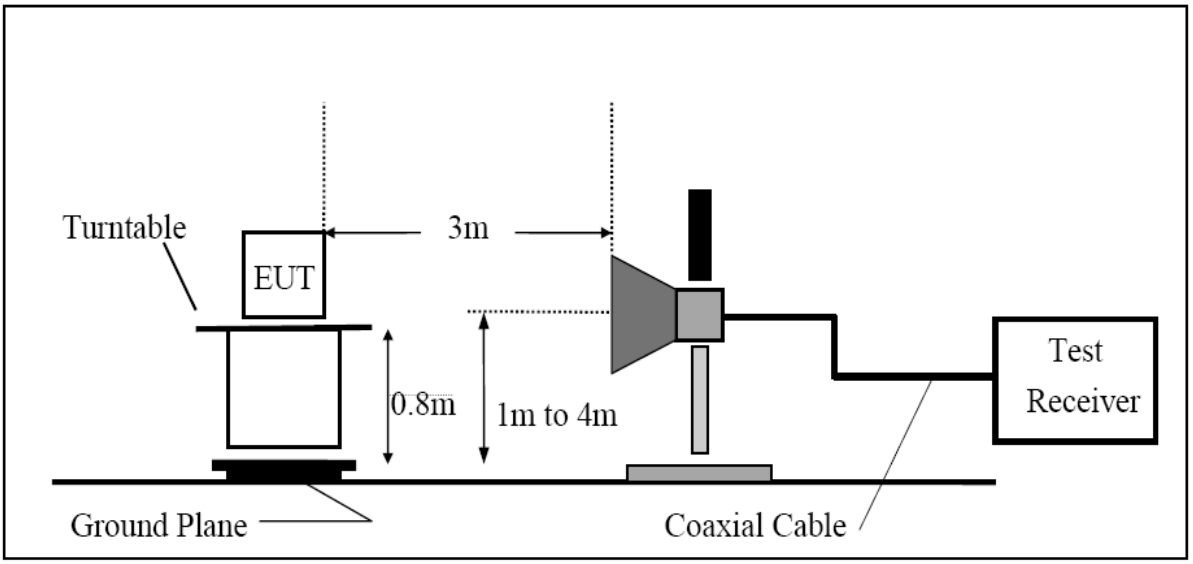
** The emission limits shown in the above table are based on measurement instrumentation employing a CISPR quasi-peak detector and above 1000 MHz are based on the average value of measured emissions.

6.7.2 Test Setup Layout

6.7.2.1 Radiated Emission Test Set-Up, Frequency Below 1000MHz



6.7.2.2 Radiated Emission Test Set-UP Frequency Over 1000MHz



6.7.3 Test Procedure

1) Band-edge Compliance of RF Conducted Emissions

1. Set the spectrum analyzer as follows:

Span = wide enough to capture the peak level of the emission operating on the channel closest to the bandedge, as well as any modulation products which fall outside of the authorized band of operation

RBW ≥ 1% of the span

VBW ≥ RBW

Sweep = auto

Detector function = peak

Trace = max hold

2. Allow the trace to stabilize. Set the marker on the emission at the band-edge, or on the highest modulation product outside of the band, if this level is greater than that at the band-edge. Enable the marker-delta function, and then use the marker-to-peak function to move the marker to the peak of the in-band emission.
3. Now, using the same instrument settings, enable the hopping function of the EUT. Allow the trace to stabilize. Follow the same procedure listed above to determine if any spurious emissions caused by the hopping function also comply with the specified limit.

2) Spurious RF Conducted Emissions:

1. Set the spectrum analyzer as follows:

Span = wide enough to capture the peak level of the in-band emission and all spurious emissions (e.g., harmonics) from the lowest frequency generated in the EUT up through the 10th harmonic. Typically, several plots are required to cover this entire span.

RBW = 100 kHz

VBW ≥ RBW

Sweep = auto

Detector function = peak

Trace = max hold

2. Allow the trace to stabilize. Set the marker on the peak of any spurious emission recorded.

3) Spurious Radiated Emissions:

1. The preliminary radiated measurements were performed to determine the frequency producing the maximum emissions in an anechoic chamber at a distance of 3 meters for above 30 MHz, and at 1 meter distance for below 30 MHz.
2. The EUT was placed on the top of the 0.8-meter height, 1 × 1.5 meter non-metallic table. To find the maximum emission levels, the height of a measuring antenna was changed and the turntable was rotated 360°.

3. The antenna polarization was also changed from vertical to horizontal. The spectrum was scanned from 9 kHz to 30 MHz using the loop antenna, from 30 to 1000 MHz using the Trilog broadband antenna, and from 1 GHz to tenth harmonic of the highest fundamental frequency using the horn antenna.
4. To obtain the final measurement data, the EUT was arranged on a turntable situated on a 4 × 4 meter at the Open Area Test Site. The EUT was tested at a distance 3 meters.
5. Each frequency found during preliminary measurements was re-examined and investigated. The test-receiver system was set up to average, peak, and quasi-peak detector function with specified bandwidth.
6. The EUT is situated in three orthogonal planes (if appropriate)
7. The presence of ambient signals was verified by turning the EUT off. In case an ambient signal was detected, the measurement bandwidth was reduced temporarily and verification was made that an additional adjacent peak did not exist. This ensures that the ambient signal does not hide any emissions from the EUT.
8. If the emission on which a radiated measurement must be made is located at the edge of the authorized band of operation, then the alternative “marker-delta” method may be employed.

4) Marker-Delta Method at the edge of the authorized band of operation:

1. Perform an in-band field strength measurement of the fundamental emission using the RBW and detector function as the above Spurious Radiated Emissions test procedure.
2. Choose a spectrum analyzer span that encompasses both the peak of the fundamental emission and the band-edge emission under investigation. Set the analyzer RBW to 1% of the total span (but never less than 30 kHz) with a video bandwidth equal to or greater than the RBW. Record the peak levels of the fundamental emission and the relevant band-edge emission (i.e., run several sweeps in peak hold mode). Observe the stored trace and measure the amplitude delta between the peak of the fundamental and the peak of the band-edge emission. This is not a field strength measurement; it is only a relative measurement to determine the amount by which the emission drops at the band-edge relative to the highest fundamental emission level.
3. Subtract the delta measured in step (2) from the field strengths measured in step (1). The resultant field strengths (CISPR QP, average, or peak, as appropriate) are then used to determine band-edge compliance as required by Section 15.205.
4. The above "delta" measurement technique may be used for measuring emissions that are up to two "standard" bandwidths away from the band-edge, where a "standard" bandwidth is the bandwidth specified by C63.4 for the frequency being measured. For example, for band-edge measurements in the restricted band that begins at 2483.5 MHz, C63.4 specifies a measurement bandwidth of at least 1 MHz. Therefore you may use the "delta" technique for measuring emissions up to 2 MHz removed from the band-edge. Radiated emissions that are removed by more than two “standard” bandwidths must be measured as the above Spurious Radiated Emissions test procedure.

6.7.4 Test Results:

Band-edge compliance of RF conducted/radiated emissions was shown in the 6.7.5 and 6.7.6.

NOTE: We took the insertion loss of the cable loss into consideration within the measuring instrument.

Spurious RF conducted emissions were shown in the 6.7.7.

NOTE: We took the insertion loss of the cable loss into consideration within the measuring instrument.

Table 6 : Measured values of the Field strength of spurious emission (Transmit mode)

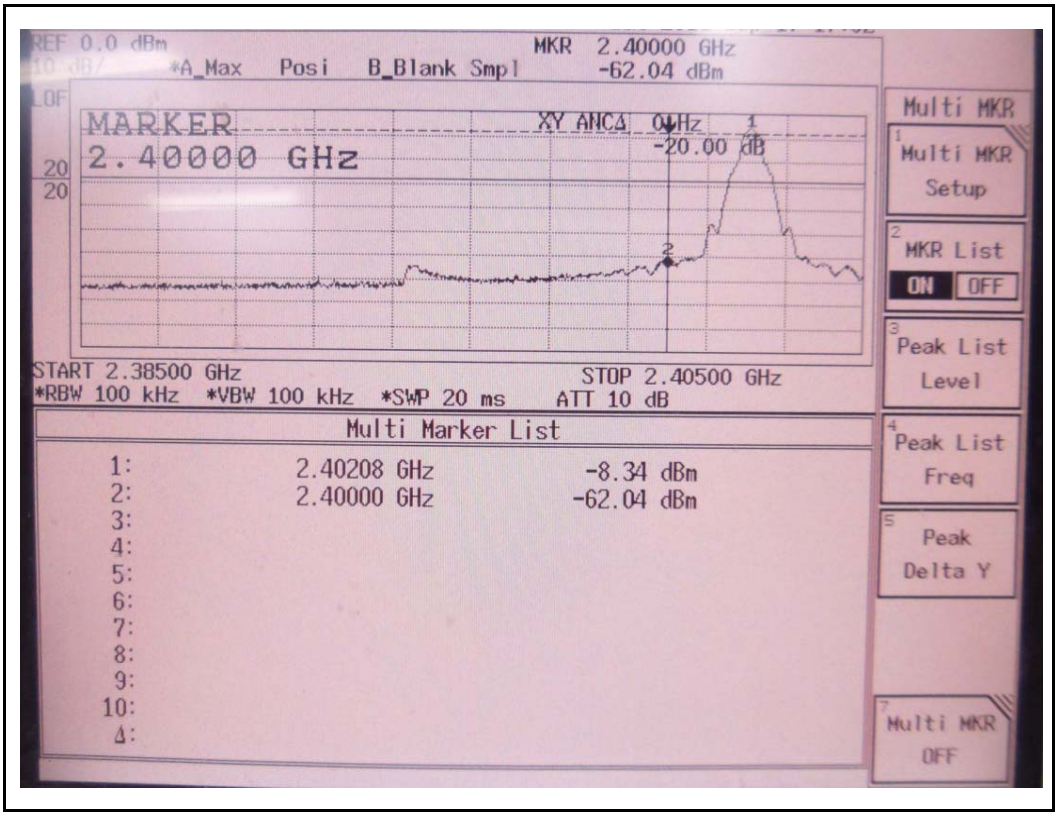
Frequency (MHz)		Detect Mode	Polarization (V/H)	Emission Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)
Average/Peak/Quasi-peak data, emissions below 30 MHz						
	No Critical peaks Found					
Quasi-peak data, emissions below 1000 MHz						
	No Critical peaks Found					
Peak/Average data, emissions above 1000 MHz						
2402	4820	Peak	V	49.00	74.00	25.00
	4820	Average	V	42.60	54.00	11.40
	5035	Peak	H	42.58	74.00	31.42
	5035	Average	H	36.28	54.00	17.72
2441	4899	Peak	V	65.60	74.00	8.40
	4899	Average	V	44.40	54.00	9.60
	5114	Peak	H	61.28	74.00	12.72
	5114	Average	H	45.18	54.00	8.82
2480	4978	Peak	V	64.85	74.00	9.15
	4978	Average	V	44.65	54.00	9.35
	5193	Peak	H	59.78	74.00	14.22
	5193	Average	H	43.68	54.00	10.32

1. Margin (dB) = Limit – Emission Level
2. H = Horizontal, V = Vertical Polarization

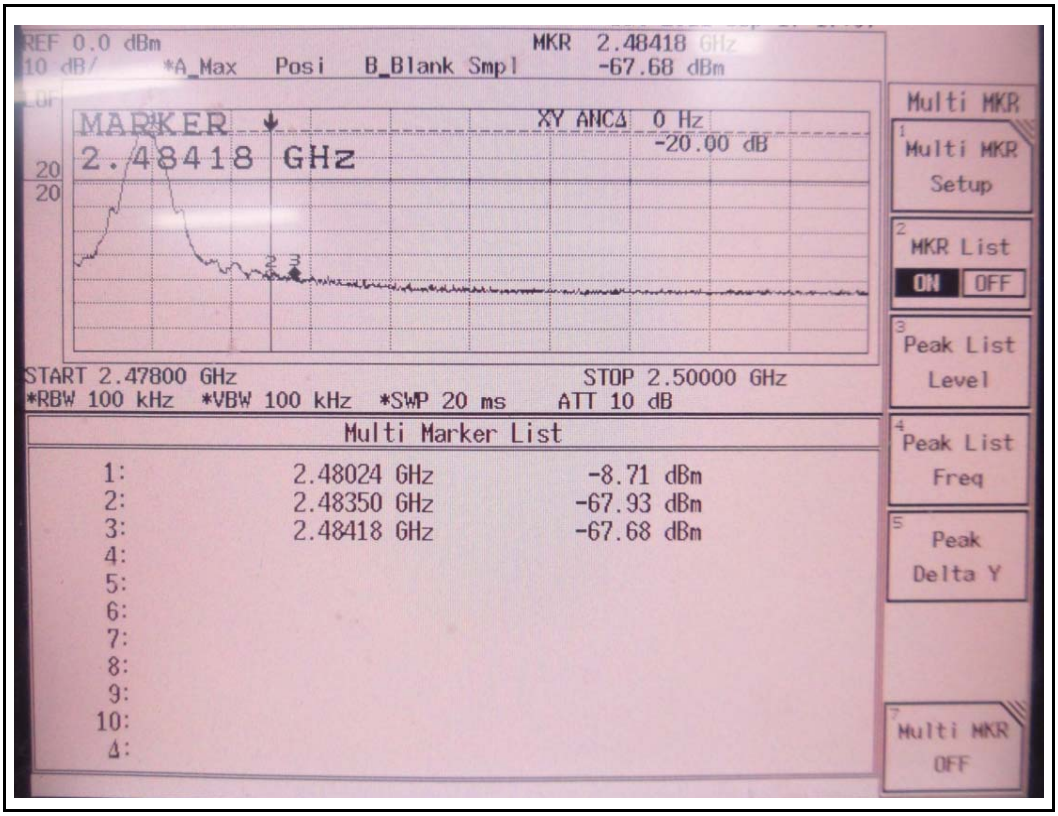
6.7.5 Plot of the Band Edge (Conducted)

Basic (GFSK)

Lowest Channel



Highest Channel



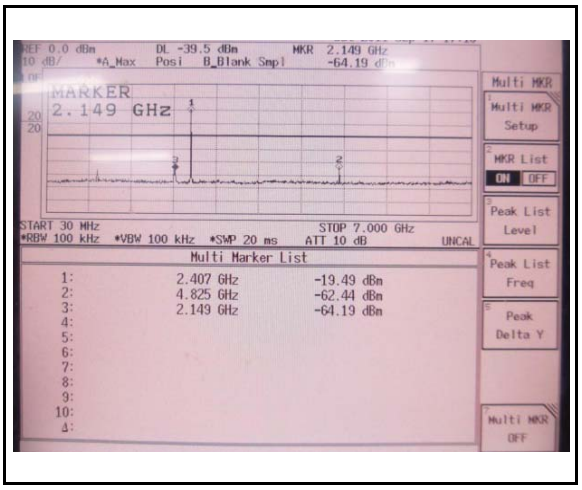
6.7.6 Plot of the Band Edge (Radiated)

Table 7 : Measured values of the Band Edge(Radiated)					
Frequency (MHz)		Detect Mode	Emission Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)
2402	2494.46	Peak	35.64	74	38.36
	2488.50	Average	24.87	54	29.13
2480	2486.82	Peak	36.05	74	37.95
	2493.76	Average	24.71	54	29.29

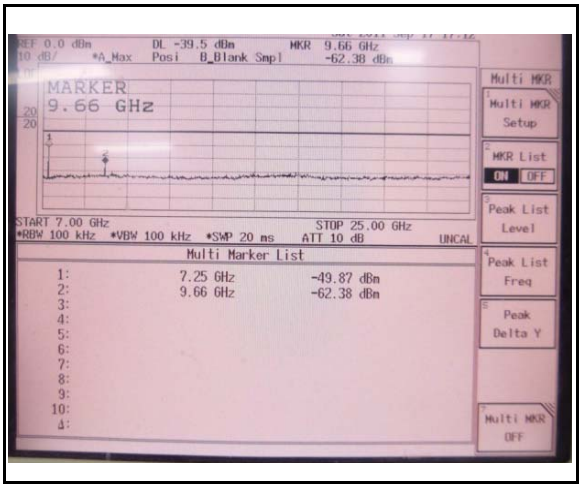
6.7.7 Plot of the Spurious RF conducted emissions

Basic (GFSK)

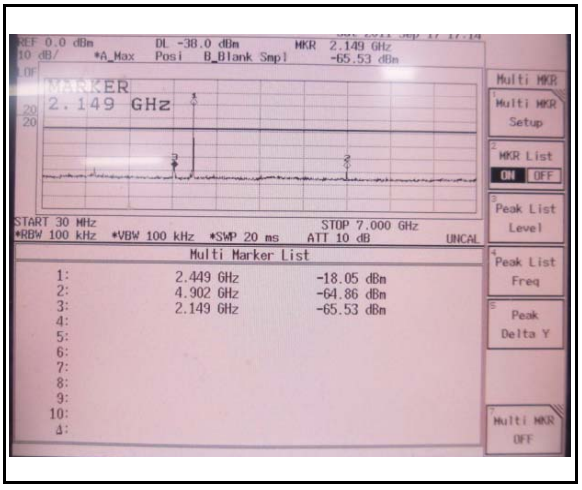
Lowest Channel : 30MHz ~ 7GHz



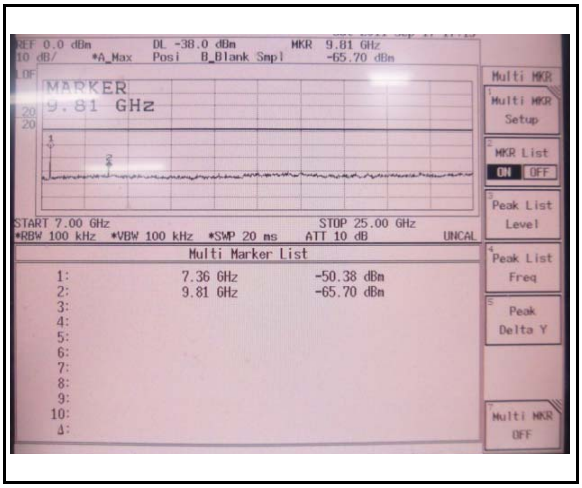
Lowest Channel : 7GHz ~ 26.5GHz



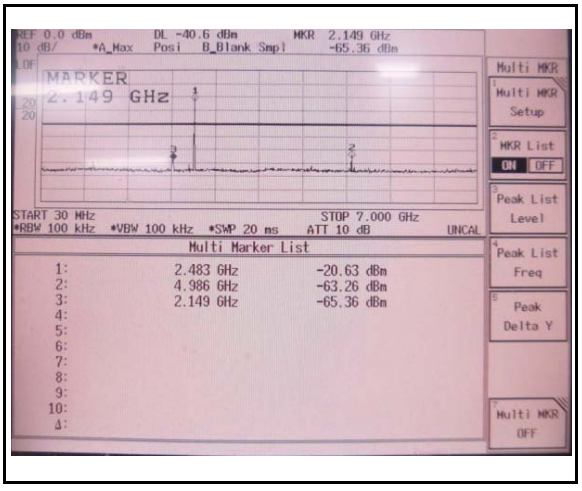
Middle Channel : 30MHz ~ 7GHz



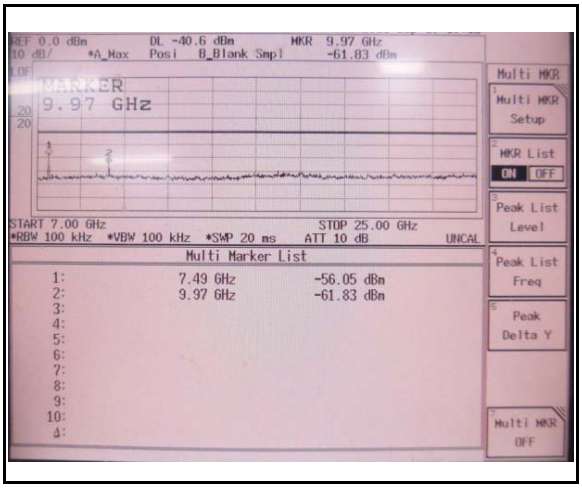
Middle Channel : 7GHz ~ 26.5GHz



Highest Channel : 30MHz ~ 7GHz



Highest Channel : 7GHz ~ 26.5GHz



6.8 AC Power Line Conducted Emissions

6.8.1 Regulation

According to §15.207(a), for an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies, within the band 150 kHz to 30 MHz, shall not exceed the limits in the following table, as measured using a 50μH/50Ω line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the boundary between the frequency ranges.

Frequency of emission (MHz)	Conducted limit (dBμV)	
	Qausi-peak	Average
0.15 – 0.5	66 to 56 *	56 to 46 *
0.5 – 5	56	46
5 – 30	60	50

* Decreases with the logarithm of the frequency.

According to §15.107(a), for unintentional device, except for Class A digital devices, line conducted emission limits are the same as the above table.

6.8.2 Test Procedure

1. The EUT was placed on a wooden table of size, 1 m by 1.5 m, raised 80 cm in which is located 40 cm away from the vertical wall and 1.5m away from the side wall of the shielded room.
2. Each current-carrying conductor of the EUT power cord was individually connected through a 50Ω/50μH LISN, which is an input transducer to a Spectrum Analyzer or an EMI/Field Intensity Meter, to the input power source.
3. Exploratory measurements were made to identify the frequency of the emission that had the highest amplitude relative to the limit by operating the EUT in a range of typical modes of operation, cable position, and with a typical system equipment configuration and arrangement. Based on the exploratory tests of the EUT, the one EUT cable configuration and arrangement and mode of operation that had produced the emission with the highest amplitude relative to the limit was selected for the final measurement.
4. The final test on all current-carrying conductors of all of the power cords to the equipment that comprises the EUT (but not the cords associated with other non-EUT equipment is the system) was then performed over the frequency range of 0.15 MHz to 30 MHz.
5. The measurements were made with the detector set to PEAK amplitude within a bandwidth of 10 kHz or to QUASI-PEAK and AVERAGE within a bandwidth of 9 kHz. The EUT was in trans--mitting mode during the measurements.

6.8.2 Test Results:

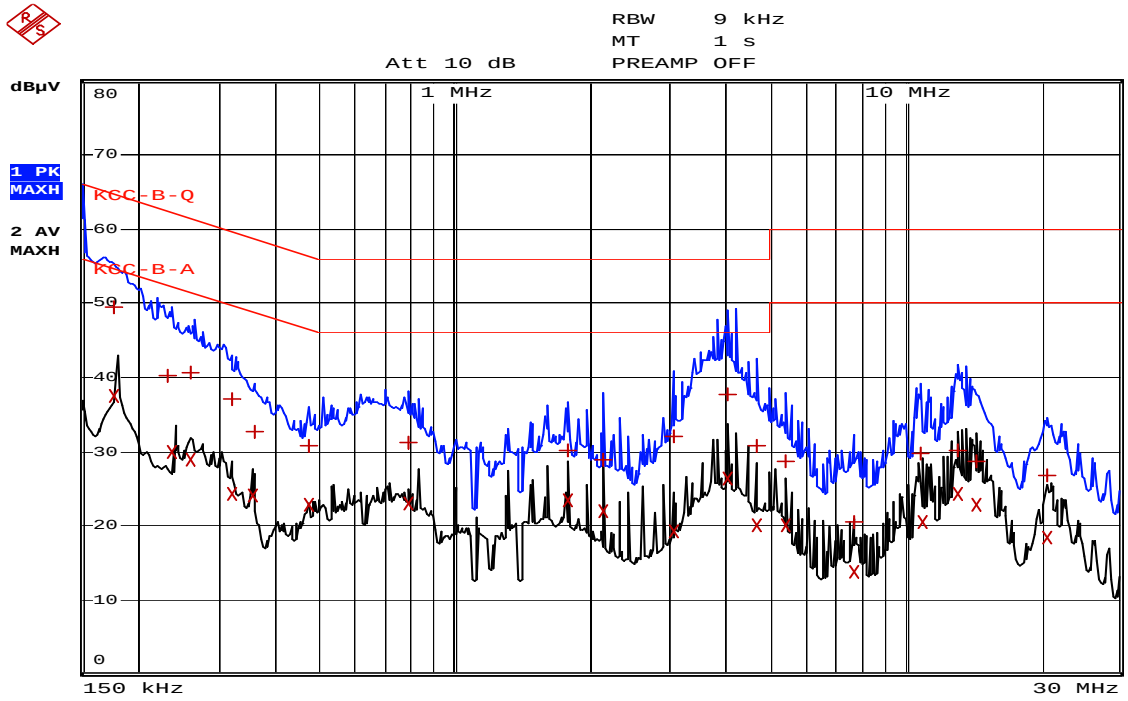
Table 8 : Measured values of the AC Power Line Conducted Emissions

Frequency (MHz)	Mode	Hot/Neutral (H/N)	Measured Value (dBμV)	Correction Factor (dB)	Cable Loss (dB)	Emission Level (dBμV)	Limit (dBμV)	Margin (dB)
0.18	Qausi-peak	H	51.00	0.04	0.01	51.05	64.49	13.44
	Average		38.26			38.31	54.49	16.18
0.24	Qausi-peak	H	42.70	0.04	0.01	42.75	62.10	19.35
	Average		30.22			30.27	52.10	21.83
0.26	Qausi-peak	N	40.56	0.03	0.01	40.60	61.43	20.83
	Average		28.76			28.80	51.43	22.63
0.30	Qausi-peak	H	39.37	0.04	0.01	39.42	60.24	20.82
	Average		29.50			29.55	50.24	20.69
0.36	Qausi-peak	N	32.69	0.03	0.01	32.73	58.73	26.00
	Average		24.02			24.06	48.73	24.67
0.47	Qausi-peak	N	30.66	0.03	0.01	30.70	56.51	25.81
	Average		22.69			22.73	46.51	23.78
0.65	Qausi-peak	H	33.72	0.04	0.01	33.77	56.00	22.23
	Average		23.22			23.27	46.00	22.73
1.78	Qausi-peak	N	30.21	0.05	0.02	30.28	56.00	25.72
	Average		23.51			23.58	46.00	22.42
2.14	Qausi-peak	N	28.89	0.05	0.02	28.96	56.00	27.04
	Average		22.04			22.11	46.00	23.89
3.64	Qausi-peak	H	33.31	0.08	0.04	33.43	56.00	22.57
	Average		21.73			21.85	46.00	24.15
4.04	Qausi-peak	N	37.65	0.07	0.05	37.77	56.00	18.23
	Average		26.28			26.40	46.00	19.60
4.30	Qausi-peak	H	34.17	0.09	0.05	34.31	56.00	21.69
	Average		21.83			21.97	46.00	24.03
5.46	Qausi-peak	N	28.67	0.08	0.06	28.81	60.00	31.19
	Average		19.98			20.12	50.00	29.88
7.94	Qausi-peak	H	21.26	0.15	0.07	21.48	60.00	38.52
	Average		13.49			13.71	50.00	36.29
10.79	Qausi-peak	N	29.63	0.15	0.10	29.88	60.00	30.12
	Average		-			-	-	-
13.64	Qausi-peak	H	30.23	0.25	0.10	30.58	60.00	29.42
	Average		-			-	-	-
14.42	Qausi-peak	N	28.60	0.18	0.10	28.88	60.00	31.12
	Average		22.79			23.07	50.00	26.93
20.74	Qausi-peak	N	26.73	0.26	0.17	27.16	60.00	32.84
	Average		-			-	-	-

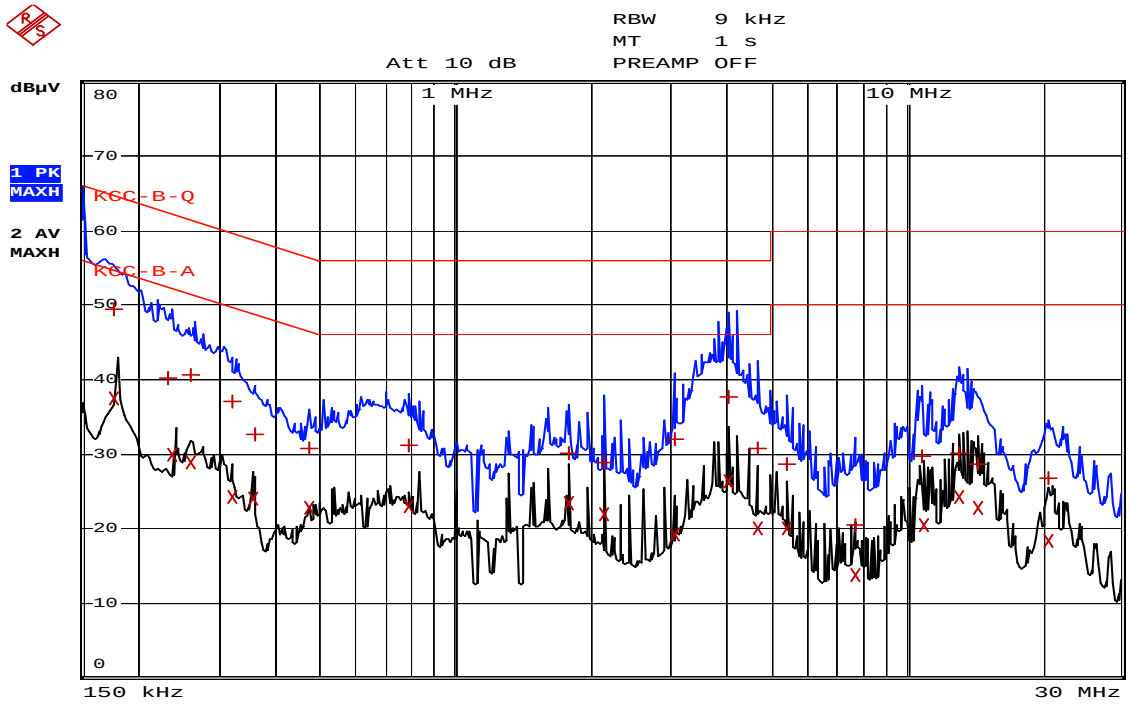
1. Margin (dB) = Limit – Emission Level
2. Emission Level = Measured Value + CF + CL

6.8.3 Plot of the AC Power Line Conducted Emissions

HOT LINE



NEUTRAL LINE



6.8 RECEIVER SPURIOUS EMISSIONS

6.8.1 Regulation

According to §15.209(a), for an intentional device, the general requirement of field strength of radiated emissions from intentional radiators at a distance of 3 meters shall not exceed the following values:

Frequency (MHz)	Field strength (μV/m @ 3m)	Field strength (dBμV/m @ 3m)
30–88	100.0	40.0
88–216	150.0	43.5
216–960	200.0	46.0
Above 960	500.0	54.0

According to §15.109(a), for an unintentional device, except for Class A digital devices, the field strength of radiated emissions from unintentional radiators at a distance of 3 meters shall not exceed the above table.

** The emission limits shown in the above table are based on measurement instrumentation employing a CISPR quasi-peak detector and above 1000 MHz are based on the average value of measured emissions.

6.5.2 Test Condition

- Detector mode : CISPR Quasi - Peak mode (6dB Bandwidth : 120 kHz)
- The following table shows the highest levels of radiated emissions on both polarization of horizontal and vertical.

6.8.2 Test Results : PASS

Table 9 : Measured values of the Field strength of spurious emission (Receiver mode)

Frequency (MHz)	Detect Mode	Polarization (V/H)	Emission Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)
Quasi-peak data, emissions below 1000 MHz					
	No Critical peaks Found				
Peak/Average data, emissions above 1000 MHz					
	No Critical peaks Found				

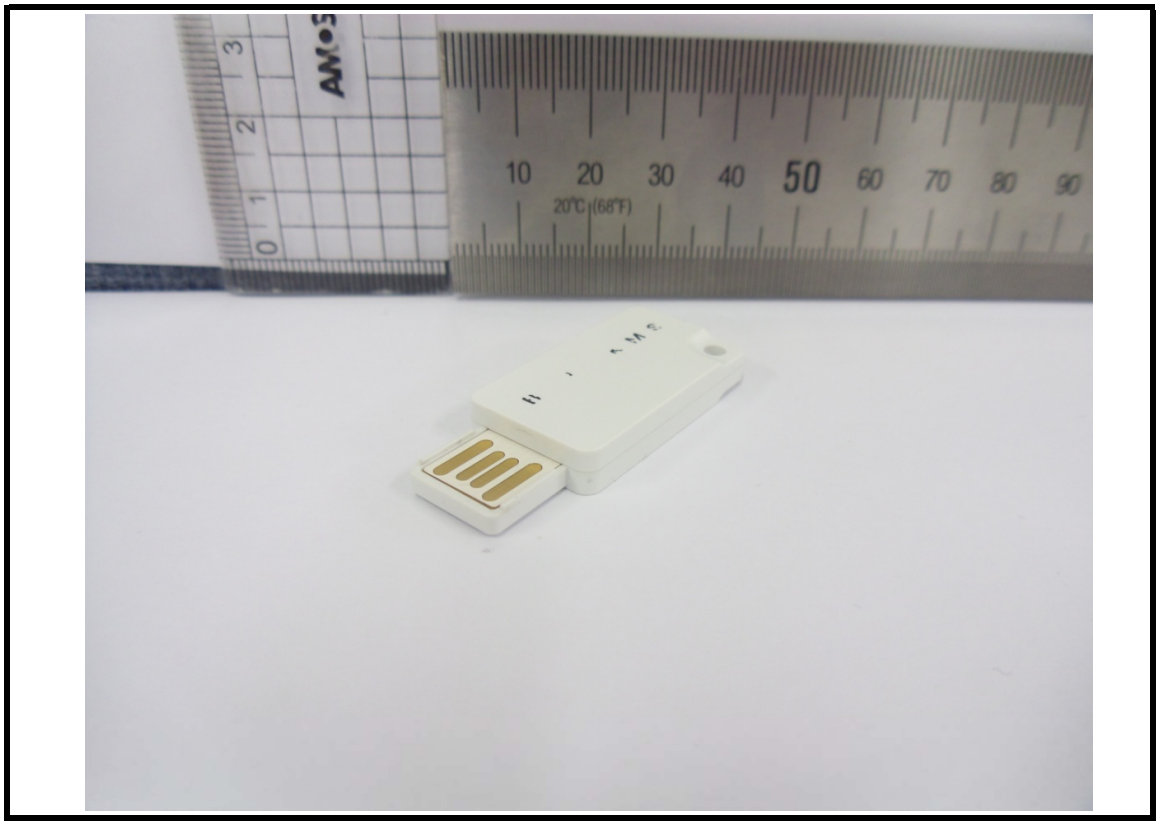
1. Margin (dB) = Limit – Emission Level
2. H = Horizontal, V = Vertical Polarization

7.Test Equipment Used For Test

Used equipment	Description	Manufacturer	Model Name	Serial Number	Specifications	Next Cal. Data
■	Spectrum Analyzer	ADVANTEST	R3273	101102518	100Hz ~ 26.5GHz	2011-10-15
■	MICROWAVE FREQUENCY	ANRITSU	MF2414B	6200003197	10Hz ~ 26.5GHz	2011-10-15
□	EPM-P SERIES POWER METER	Agilent	E4416A	GB38272722	1CH 100-240VAC	2011-10-15
□	Power Sensor	Agilent	8481A	US41030240	MAX.23dBm, AVG, 18GHz	2011-10-15
□	Signal Generator	ROHDE&SCHWARZ	SMIQ03B	832870/056	300kHz ~ 3.3GHz	2011-10-15
□	Modulation Analyzer	HP	8901B	3028A02980	150kHz-1.3GHz	2011-10-15
□	Audio Analyzer	HP	8903B	3729A17164	20Hz-100kHz	2011-10-15
□	Attenuator	Weinschel	41-6-12	21644	6dB, 10W	2011-10-16
□	Attenuator	Weinschel	41-10-12	13218	10dB, 10W	2011-10-16
□	Dual Directional Coupler	HP	778D	15923	20dB Coupler	2011-10-12
□	BT SIMULATOR	TESCOM CO. LTD	TC-3000A	3000A4C0158	100-240VAC 50/60Hz 40W	2011-10-15
□	Power Divider	H.P	11636B	07317	DC-26.5GHz	2011-10-16
□	Power Divider	H.P	11636B	07412	DC-26.5GHz	2011-10-16
■	Test receiver	ROHDE&SCHWARZ	ESPI3	101171	9kHz~3GHz	2012-08-12
■	BI-LOG ANT	SCHWARZBECK	VULB9163	398	30MHz~1GHz	2013-10-04
■	Loop Antenna	EMCO	6502	9801-3191	9KHz~30MHz	2011-12-23
■	Controller (RE)	Audix Coporation	act-t200	2001814003	-	-
■	Antenna Master	Audix Coporation	act-a400	20090812002	4M	-
■	Turn Table	Audix Coporation	act-t200	2009814072	450kg	-
■	Amplifier	SOMOMA	310	291723	9kHz ~ 1GHz	2011-10-12
□	DC Power Supply	ODA Tech	OPE-505S	oda-01-0923-03430	1CH 50V 5A	2011-10-16
□	Slidacs	Daekwang	-	-	5KVA, OUTPUT:AC:0~300V	-
□	DC Power Supply	Fine Suntronix	IT6720	4001132	1CH 60V 5A	-
■	DC Power Supply	Maynuo	M8811	0800010960011103046	30V 5A	2012-08-16
■	ARTFICIAL MAINS NETWORK	SCHWARZBECK	NSLK 8127	8127518	9kHz~30MHz	2011-10-15
□	ARTFICIAL MAINS NETWORK	PMM	L2-16A	1100X90603	9kHz~30MHz	2011-10-15
□	Digital Mutil Meter	UTI	DMSC 683A	06086830042	750V 10A	2011-10-15
□	Continuous operation tester	-	-	-	MAX 9990시간	-
□	Vibration Tester	Gana	GNV-500	-	0~60Hz/50Kg	2011-10-12
□	Humidity Chamber	BUM JIN Eng.	-	-	-40~120°C 95%	2012-09-16
□	Drop Tester	JUNG JIN Eng.	-	-	0-120Cm	-
■	Preamplifier	H.P	8449B	3008A00581	1GHz ~ 26.5GHz	2012-01-27
■	horn antenna	Schwarzbeck	BBHA 9120D	352	1GHz ~ 18GHz	2013-03-22
■	horn antenna	ETS.lindgren	3116	0086632	18GHz ~ 40GHz	2011-12-17
□	Notch filter	Sambow adtech	-	-	-	2012-08-27

8. EUT Photographs

8.1 Front view



8.2 Back view